

Claims

The following listing of claims will replace all prior versions of claims.

1. (Currently Amended) A method for increasing the fault tolerance in a network, said method comprising acts of:

associating a plurality of nodes with a sub-network, each of said plurality of nodes capable of sending and receiving data;

adding a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes, to said sub-network, said plurality of CCA-capable nodes capable of receiving data from and sending data to said plurality of nodes; and

determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby said gateway CCA is used by each one of said plurality of nodes within said sub-network to communicate with the rest of the network;

wherein the act of determining further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node to the plurality of nodes every T1 seconds; and

selecting a gateway CCA based upon the message from each CCA-capable node; and

wherein the act of selecting further comprises acts of:

determining a current time at which the message was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received; and

selecting and assigning a new gateway CCA ~~based upon a result of a formula for~~

~~comparing the current time and the gateway time from the responding CCA-capable nodes such that $TLAST < (current\ time - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.~~

2. (Currently Amended) The method of Claim 1, wherein the act of determining the assignment of the gateway CCA further comprises sub-acts of:
querying the gateway CCA from each node to determine whether ~~[[it]]~~the gateway CCA is active and awaiting a response, and when:
the gateway CCA responds, repeating the querying act; otherwise, broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and when:
a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA;
otherwise, repeating the broadcasting act.

3. (Original) The method of Claim 2, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

4. (Cancelled)

5. (Currently Amended) The method of Claim 1, wherein said act of determining further comprises acts of:
querying the plurality of CCA-capable nodes, from each node, to determine whether ~~[[they]]~~the plurality of CCA-capable nodes are active and awaiting a response, and when:

the gateway CCA responds, repeating the querying act;
otherwise, changing the CCA-capable node assigned to be the gateway CCA based upon
a response from the plurality of CCA-capable nodes.

6. (Original) The method of Claim 5, wherein when a plurality of CCA-capable
nodes respond, selecting from the plurality of CCA-capable nodes responding, a single
CCA-capable node for use by all of the nodes as the gateway CCA.

7. (Cancelled)

8. (Currently Amended) The method of Claim 1, wherein said act of determining
further comprises acts of:
compiling a list of Responding CCA-capable nodes on at least one CCA-capable node;
querying each CCA-capable node, from at least one CCA-capable node, in the list to
determine ~~[[its]]~~ the state of each CCA-capable node;
updating the list of Responding CCA-capable nodes based on a response from each of the
CCA-capable nodes; and
checking for a response from the gateway CCA, and when: the gateway CCA responds,
repeating the querying act; otherwise,
transmitting the list of Responding CCA-capable nodes to the plurality of nodes in the
sub-network; and
selecting and assigning a new gateway CCA from the list of Responding CCA capable
nodes.

9. (Cancelled)

10. (Currently Amended) The method of Claim 1, wherein the act of determining further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node, in the plurality of Responding CCA-capable nodes to determine its state;

updating a list of Responding CCA-capable nodes, stored on the at least one CCA capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and when:

the gateway CCA is in the list of CCA-capable nodes, said at least one node waiting for the next list of Responding CCA-capable nodes; otherwise,

selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

11. (Cancelled)

12.(Cancelled)

13. (Cancelled)

14.(Cancelled)

15. (Currently Amended) The method of Claim 1, wherein said act of determining further comprises acts of:

transmitting a vote from each Responding CCA-capable node to all other CCA-capable nodes identifying which CCA-capable node has been designated a subsequent gateway CCA; and

tallying said votes for each CCA-capable node, and when:

one CCA-capable node receives more votes than any of the other CCA capable nodes, assigning the one CCA-capable node to become the new gateway CCA, otherwise repeating the transmitting act.

16. (Original) The method of Claim 15 further comprising an act of determining if at least $\frac{2}{3}$ of the plurality of CCA-capable nodes are active, and wherein at least $\frac{2}{3}$ of the CCA- capable nodes must respond before performing the act of transmitting the vote.

17. (Original) The method of Claim 1, wherein the act of associating the plurality of nodes further comprises an act of associating the plurality of nodes in an ad-hoc manner.

18. (Original) The method of Claim 1, further comprising an act of providing at least a portion of the plurality of nodes and CCA-capable nodes that are able to be mobile.

19. (Currently Amended) A network comprising:

- a plurality of nodes, each of said plurality of nodes capable of sending and receiving data, the plurality of nodes forming a first sub-network;
- a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes, at least one of said plurality of CCA-capable nodes capable of communicating with the plurality of nodes and capable of communicating with a second sub-network,
- wherein the plurality of nodes and the plurality of CCA-capable nodes communicate to determine which CCA-capable node to assign as a gateway CCA, whereby the gateway CCA is used by each one of the plurality of nodes and the remaining CCA-capable nodes to communicate with the second sub-network;
- a designation instruction block in each of the CCA-capable nodes for designating one of the plurality of CCA-capable nodes to be a gateway CCA;
- a broadcast message sent from each CCA-capable node every T1 seconds to the plurality of nodes; and
- a selecting instruction block in each of the CCA-capable nodes for selecting a gateway CCA based upon a received active message from each CCA-capable node; and
- wherein the selecting instruction block comprises:
 - a current time determination instruction block for determining a current time at which the message was received;
 - a retrieving instruction block for retrieving a gateway time TLAST at which a message from the gateway CCA was received; and
 - a selecting and assigning instruction block for selecting and assigning a new gateway

~~CCA based upon a result of a formula for comparing the current time and the gateway time from the responding CCA-capable nodes such that $TLAST < (current\ time - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.~~

20. (Currently Amended) The network of Claim 19 further comprising:
a designation message for designating one of the plurality of Responding CCA-capable nodes as the gateway CCA;
a querying message sent from each node to the gateway CCA to determine whether the gateway CCA is active;
a timeout period where each node waits for a response from the gateway CCA, and when:
the gateway CCA responds, a second querying message is sent; otherwise, a solicit message is sent to the plurality of Responding CCA-capable nodes, and when:
a CCA-capable node responds, an assignment instruction block assigns the CCA-capable node as the gateway CCA;
otherwise, a second solicit message is sent.

21. (Original) The network of Claim 20, wherein when a plurality of CCA-capable nodes respond to the solicit message, the assignment instruction block selects a single CCA capable node from the plurality of CCA-capable nodes responding to the solicit message, for use by all of the nodes as the gateway CCA.

22. (Cancelled)

23. (Currently Amended) The network of Claim 19 further comprising:

- a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;
- a query message sent from each node for querying the plurality of Responding CCA-capable nodes to determine whether they are active;
- a timeout period where each node waits for a response from each of the plurality of Responding CCA-capable nodes;
- a gateway CCA response message, whereby when a gateway CCA response message is received, a second query message is sent and if no gateway CCA response message is received an assignment instruction block changes the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of Responding CCA-capable nodes.

24. (Currently Amended) The network of Claim 23, when a plurality of CCA-capable nodes respond to the query message, the assignment instruction block selects a single CCA-capable node from the plurality of Responding CCA-capable nodes responding to the solicit message, for use by all of the nodes as the gateway CCA.

25. (Cancelled)

26. (Currently Amended) The network of Claim 19 further comprising:

- a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;
- a compiling instruction block for compiling a list of CCA-capable nodes on at least one

CCA-capable node of the plurality of Responding CCA-capable nodes;

a query message sent from the at least one CCA-capable node for querying each CCA-capable node in the list to determine its state, whereby the compiling instruction block updates the list of Responding CCA-capable nodes based on a response from each of the CCA-capable nodes; and checks for a response from the gateway CCA, and when the gateway CCA responds, a second query message is sent; otherwise,

a transmitting instruction block transmits the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and

a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

27. (Cancelled)

28. (Currently Amended) The network of Claim 19 further comprising:

a designation instruction block, on at least one CCA-capable node of the plurality of Responding CCA-capable nodes, for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;

a query message sent from at least one CCA-capable node of the plurality of CCA-capable nodes for querying each CCA-capable node in the plurality of Responding CCA-capable nodes to determine its state;

a compiling instruction block, on the at least one CCA-capable node, for compiling a list of CCA-capable nodes based on a response from each of the Responding CCA-capable nodes;

a sending instruction block, on the at least one CCA-capable node, for sending the list of

Responding CCA-capable nodes to the plurality of nodes in the sub-network; and
a checking instruction block, on the plurality of nodes, for checking the list of
Responding CCA-capable nodes for the gateway CCA, whereby when the gateway CCA
is in the list of Responding CCA-capable nodes the node waits for the next list of
Responding CCA-capable nodes; otherwise,
a selecting and assigning instruction block in each node selects and assigns a new
gateway CCA from the list of Responding CCA-capable nodes.

29. (Cancelled)

30.(Cancelled)

31. (Cancelled)

32. (Cancelled)

33. (Currently Amended) The network of Claim 19 further comprising:
a designation instruction block in each of the CCA-capable nodes for designating one of
the plurality of Responding CCA-capable nodes to be a gateway CCA;
a transmitting instruction block for transmitting a vote from each CCA-capable node to
all other CCA-capable nodes identifying which Responding CCA-capable node has been
designated_a subsequent gateway CCA; and
a tallying instruction block in each of the CCA-capable nodes for tallying said votes for
each Responding CCA-capable node, whereby when one Responding CCA-capable node
receives more votes than any of the other CCA-capable nodes,
an assigning instruction block assigns the one Responding CCA-capable node to become

the new gateway CCA, otherwise

the transmitting instruction block transmits a second vote.

34. (Original) The network of Claim 33 further comprising a determination instruction block for determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before the transmitting instruction block transmits a vote.

35. (Original) The network of Claim 19, wherein the network is an ad-hoc network.

36. (Original) The network of Claim 19, wherein at least a portion of the plurality of nodes and CCA-capable nodes are mobile.

37. (Currently Amended) A computer-readable medium having computer-executable instructions for causing a computer to perform operations of:
associating a plurality of nodes with a sub-network, each of said plurality of nodes capable of sending and receiving data;
adding a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes, to said sub-network, said plurality of CCA-capable nodes capable of receiving data from and sending data to said plurality of nodes; and

determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby said gateway CCA is used by each one of said plurality of nodes within said sub-network to communicate with the rest of the network
wherein the act of determining further comprises acts of:
designating one of the plurality of CCA-capable nodes to be a gateway CCA;
broadcasting a message from each CCA-capable node to the plurality of nodes every T1 seconds; and
selecting a gateway CCA based upon the message from each CCA-capable node; and
wherein the act of selecting further comprises acts of:
determining a current time at which the message was received;
retrieving a gateway time TLAST at which a message from the gateway CCA was received; and
selecting and assigning a new gateway CCA ~~based upon a result of a formula for comparing the current time and the gateway time from the responding CCA-capable nodes such that $TLAST < (\text{current time} - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.~~

38. (Previously Presented) The computer-readable medium of Claim 37, wherein the act of determining further comprises sub-acts of:
querying the gateway CCA from each node to determine whether it is active and awaiting a response, and when:
the gateway CCA responds, repeating the querying act; otherwise,

broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and when:

a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA;
otherwise, repeating the broadcasting act.

39. (Original) The computer-readable medium of Claim 38, wherein when a plurality of CCA capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

40. (Cancelled)

41. (Currently Amended) The computer-readable medium of Claim 37, wherein said act of determining further comprises acts of:
querying the plurality of Responding CCA-capable nodes, from each node, to determine whether they are active and awaiting a response, and when:
the gateway CCA responds, repeating the querying act; otherwise,
changing the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of Responding CCA-capable nodes.

42. (Original) The computer-readable medium of Claim 41, wherein when a plurality of CCA capable nodes respond, selecting from the plurality of CCA-capable

nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

43. (Cancelled)

44. (Currently Amended) The computer-readable medium of Claim 37 wherein said act of determining further comprises acts of:

compiling a list of Responding CCA-capable nodes on at least one CCA-capable node of the plurality of Responding CCA-capable nodes;

querying each CCA-capable node, from the at least one CCA-capable node, in the list to determine its state;

updating the list of Responding CCA-capable nodes based on a response from each of the CCA-capable nodes; and

checking for a response from the gateway CCA, and when:

the gateway CCA responds, repeating the querying act; otherwise,

transmitting the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and

electing and assigning a new gateway CCA from the list of Responding CCA capable nodes.

45. (Cancelled)

46. (Currently Amended) The computer-readable medium of Claim 37, wherein the act of determining further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node of the plurality of Responding CCA-capable nodes, in the plurality of Responding CCA-capable nodes to

determine its state;

updating a list of Responding CCA-capable nodes, stored on the at least one CCA capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and

checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and when:

the gateway CCA is in the list of Responding CCA-capable nodes, said at least one node waiting for the next list of CCA-capable nodes; otherwise,

selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

47. (Cancelled)

48.(Cancelled)

49.(Cancelled)

50.(Cancelled)

51. (Currently Amended) The computer-readable medium of Claim 37 wherein said act of determining further comprises acts of:

transmitting a vote from each CCA-capable node to all other CCA-capable nodes

identifying which Responding CCA-capable node has been designated a subsequent gateway CCA; and

tallying said votes for each Responding CCA-capable node, and when:
one Responding CCA-capable node receives more votes than any of the other
Responding CCA capable nodes,
assigning the one CCA-capable node to become the new gateway CCA, otherwise
repeating the transmitting act.

52. (Original) The computer-readable medium of Claim 51 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before performing the act of transmitting the vote.

53. (Original) The computer-readable medium of Claim 37 wherein the act of associating the plurality of nodes further comprises an act of associating the plurality of nodes in an ad-hoc manner.

54. (Original) The computer-readable medium of Claim 37 further comprising an act of allowing at least a portion of the plurality of nodes and CCA-capable nodes to be mobile.

55. (Currently Amended) A method for network communications, the method comprising actions of:

associating a node with a sub-network, the node capable of sending data to and receiving data from a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes; and

determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby said gateway CCA is used by the node within said sub-network to communicate with the rest of the network;

wherein the act of determining further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes; and

selecting a gateway CCA based upon the message from each CCA-capable node; and

wherein the act of selecting further comprises acts of:

determining a current time at which the message was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received; and

selecting and assigning a new gateway CCA ~~based upon a result of a formula for comparing the current time and the gateway time~~ from the responding CCA-capable nodes such that $TLAST < (\text{current time} - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.

56. (Previously Presented) The method of Claim 55, wherein the node further performs the acts of:
querying the gateway CCA from each node to determine whether it is active and awaiting a response, and when:
the gateway CCA responds, repeating the querying act; otherwise,
broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and when:
a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA;
otherwise, repeating the broadcasting act.

57. (Original) The method of Claim 56, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA capable node for use by all of the nodes as the gateway CCA.

58. (Cancelled)

59. (Currently Amended) The method of claim 55 wherein said act of determining further comprises acts of:
querying the plurality of Responding CCA-capable nodes to determine whether they are active and awaiting a response, and when:
the gateway CCA responds, repeating the querying act; otherwise,
changing the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of Responding CCA-capable nodes.

60. (Original) The method of Claim 59, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

61. (Cancelled)

62. (Original) The method of claim 55 wherein the act of associating a node further comprises an act of associating the node in an ad-hoc manner.

63. (Original) The method of claim 55 further comprising an act of providing a node capable of being mobile.

64. (Currently Amended) A node comprising:
a data processing system executing one or more instruction blocks stored on a non transitory computer readable medium, wherein said instruction blocks comprise;
a transmitting and receiving instruction block for communicating with a sub-network, the sub-network comprising of nodes and a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes; and
a determination instruction block for the node to determine which CCA-capable node to assign as a gateway CCA, whereby the gateway CCA is used by the node to communicate with a second sub-network;

wherein the determination instruction block executes every T1 seconds and further comprises: a designation instruction block in each of the CCA-capable nodes for designating one of the plurality of CCA-capable nodes to be a gateway CCA; and a selection instruction block in each of the CCA-capable nodes for selecting a gateway CCA based upon a received active message from each CCA-capable node; and wherein the selection instruction block comprises:

a current time determination instruction block for determining a current time at which the message was received;

a retrieving instruction block for retrieving a gateway time T_{LAST} at which a message from the gateway CCA was received; and

a selecting and assigning instruction block for selecting and assigning a new gateway CCA ~~based upon a result of a formula for comparing the current time and the gateway time from the responding CCA-capable nodes such that $T_{LAST} < (\text{current time} - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.~~

65. (Original) The node of Claim 64, wherein the determination instruction block further comprises:

a designation instruction block for designating one of the plurality of CCA capable nodes as the gateway CCA;

a querying message sent to the gateway CCA to determine whether the gateway CCA is active;

a timeout period where the node waits for a response from the gateway CCA, and when:

the gateway CCA responds, a second querying message is sent; otherwise, a solicit message is sent to the plurality of CCA-capable nodes, and when: a CCA-capable node responds, an assignment instruction block assigns the CCA-capable node as the gateway CCA; otherwise, a second solicit message is sent.

66. (Original) The node of Claim 64, wherein when a plurality of CCA-capable nodes respond to the solicit message, the assignment instruction block selects a single CCA-capable node from the plurality of CCA-capable nodes responding to the solicit message, for use by the node as the gateway CCA.

67. (Cancelled)

68. (Currently Amended) The node of Claim 64, wherein the determination instruction block further comprises:
a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;
a query message for querying the plurality of CCA-capable nodes to determine whether the plurality of CCA-capable nodes are active;
a timeout period where the node waits for a response from each of the plurality of CCA-capable nodes;
a gateway CCA response message, whereby when a gateway CCA response message is received, a second query message is sent and if no gateway CCA response message is received an assignment instruction block changes the CCA-capable node assigned to be

the gateway CCA based upon a response from the plurality of Responding CCA-capable nodes.

69. (Original) The node of Claim 68, when a plurality of CCA-capable nodes respond to the query message, the assignment instruction block selects a single CCA-capable node from the plurality of CCA-capable nodes responding to the solicit message, for use by the node as the gateway CCA.

70. (Cancelled)

71. (Currently Amended) A computer-readable medium having computer-executable instructions causing a computer to perform operations of:
associating the node with a sub-network, the node capable of sending and receiving data to and from a plurality of CCA-capable nodes; and
determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby said gateway CCA is used by the node within said sub-network to communicate with the rest of the network;
wherein the act of determining further comprises acts of:
designating one of the plurality of CCA-capable nodes to be a gateway CCA;
broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes; and
selecting a gateway CCA based upon the message from each CCA-capable node; and
wherein the act of selecting further comprises acts of:
determining a current time at which the message was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received; and

selecting and assigning a new gateway CCA ~~based upon a result of a formula for comparing the current time and the gateway time from the responding CCA-capable nodes such that $TLAST < (current\ time - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.~~

72. (Currently Amended) The computer-readable medium of Claim 71, wherein the act of determining further comprises sub-acts of:

querying the gateway CCA from the node to determine whether [[it] the gateway CCA] is active and awaiting a response, and when:

the gateway CCA responds, repeating the querying act; otherwise,

broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and when:

a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA; otherwise, repeating the broadcasting act.

73. (Original) The computer-readable medium of Claim 72, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by the node as the gateway CCA.

74. (Cancelled)

75. (Currently Amended) The computer-readable medium of Claim 71, wherein said act of determining further comprises acts of:
querying the plurality of CCA-capable nodes to determine whether [[they]] the plurality of CCA-capable nodes are active and awaiting a response, and when:
the gateway CCA responds, repeating the querying act; otherwise,
changing the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of CCA-capable nodes.

76. (Original) The computer-readable medium of Claim 75, wherein when a plurality of CCA capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by the node as the gateway CCA.

77. (Cancelled)

78. (Currently Amended) A method for network communications, the method comprising acts of:
associating a cross layer communication capable node, herein referred to as CCA-capable node with a sub-network, the sub-network comprising a plurality of CCA-capable nodes, the CCA-capable node capable of sending and receiving data to and from nodes within the sub-network; and
determining the CCA-capable node to assign as a gateway CCA, whereby said gateway CCA is used by the nodes within the sub-network to communicate with the rest of the network;
wherein the act of determining further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;
broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes; and
selecting a gateway CCA based upon the message from each CCA-capable node;
wherein the act of selecting further comprises acts of:
determining a current time at which the message was received;
retrieving a gateway time TLAST at which a message from the gateway CCA was received; and
selecting and assigning a new gateway CCA ~~based upon a result of a formula for~~
~~comparing the current time and the gateway time~~ from the responding CCA-capable
nodes such that $TLAST < (\text{current time} - 2(T1))$ is true, herein referred to as Responding
CCA-capable nodes.

79. (Currently Amended) The method of Claim 78, wherein said act of
determining further comprises acts of:
compiling a list of Responding CCA-capable nodes on at least on CCA-capable node of
the plurality of CCA-capable nodes;
querying each CCA-capable node, from the at least one CCA-capable node, in the list to
determine ~~[[its]]~~ the state of each CCA-capable node;
updating the list of Responding CCA-capable nodes based on a response from each of the
CCA-capable nodes; and
checking for a response from the gateway CCA, and when:

the gateway CCA responds, repeating the querying act; otherwise, transmitting the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

80. (Cancelled)

81. (Currently Amended) The method of claim 78, wherein the act of determining further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node in the plurality of CCA-capable nodes, in the plurality of CCA-capable nodes to determine ~~[[its]]~~ the state of each CCA-capable node;

updating a list of Responding CCA-capable nodes, stored on the at least on CCA capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and

checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and when:

the gateway CCA is in the list of Responding CCA-capable nodes, said at least one node

waiting for the next list of Responding CCA-capable nodes; otherwise,

selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

82. (Cancelled)

83.(Cancelled)

84. (Cancelled)

85. (Cancelled)

86. (Currently Amended) The method of Claim 78, wherein said act of determining further comprises acts of:
transmitting a vote from each Responding CCA-capable node to all other CCA-capable nodes identifying which CCA-capable node has been designated a subsequent gateway CCA; and
tallying said votes for each CCA-capable node, and when:
one CCA-capable node receives more votes than any of the other CCA-capable nodes,
assigning the one CCA-capable node to become the new gateway CCA, otherwise
repeating the transmitting act.

87. (Original) The method of claim 86 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA capable nodes must respond before performing the act of transmitting the vote.

88. (Currently Amended) A cross layer communication capable node, herein referred to as CCA-capable node comprising:
a data processing system executing one or more instruction blocks stored on a non

transitory computer readable medium, wherein said instruction blocks comprise;

a first transmitting and receiving instruction block for communicating with a sub-network, the CCA-capable node capable of sending data to and receiving data from nodes within the sub-network; and

a determination instruction block for determining the CCA-capable node to assign as a gateway CCA, whereby said gateway CCA is so assigned and used by the nodes within the sub-network to communicate with the rest of the network;

a designation instruction block for designating one of the plurality of CCA-capable nodes to be a gateway CCA;

a broadcast message sent from the CCA-capable node every T1 seconds to the plurality of nodes; and

a selecting instruction block for selecting a gateway CCA based upon a received active message from each CCA-capable node;

wherein the selecting instruction block comprises:

a current time determination instruction block for determining a current time at which the message was received;

a retrieving instruction block for retrieving a gateway time TLAST at which a message from the gateway CCA was received; and

a selecting and assigning instruction block for selecting and assigning a new gateway CCA ~~based upon a result of a formula for comparing the current time and the gateway time~~ from the responding CCA-capable nodes such that $T_{LAST} < (\text{current time} - 2(T1))$ is true, herein referred to as Responding CCA-capable nodes.

89. (Currently Amended) The CCA-capable node of Claim 88, wherein the determination instruction block further comprises:

- a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;
- a compiling instruction block for compiling a list of CCA-capable nodes;
- a query message sent from the CCA-capable node for querying each CCA capable node in the list to determine its state, whereby the compiling instruction block updates the list of Responding CCA-capable nodes based on a response from each of the CCA capable nodes, and checks for a response from the gateway CCA, and when the gateway CCA responds, a second query message is sent; otherwise,
- a transmitting instruction block transmits the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

90. (Cancelled)

91. (Currently Amended) The CCA-capable node of Claim 88 further comprising:

- a designation instruction block for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;
- a query message sent from the CCA-capable node for querying each CCA capable node in the plurality of Responding CCA-capable nodes to determine its state;
- a compiling instruction block for compiling a list of CCA-capable nodes based on a response from each of the Responding CCA-capable nodes;

a sending instruction block for sending the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and

a checking instruction block for checking the list of Responding CCA-capable nodes for the gateway CCA, whereby when the gateway CCA is in the list of Responding CCA-capable nodes the node waits for the next list of CCA-capable nodes; otherwise,

a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

92. (Cancelled)

93.(Cancelled)

94. (Cancelled)

95. (Cancelled)

96. (Currently Amended) The CCA-capable node of Claim 88 further comprising:

a designation instruction block for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;

a transmitting instruction block for transmitting a vote from the CCA-capable node to all other CCA-capable nodes identifying which Responding CCA-capable node has been designated a subsequent gateway CCA; and

a tallying instruction block in the CCA-capable node for tallying said votes for each Responding CCA-capable node, whereby when one Responding CCA-capable node receives more votes than any of the other CCA-capable nodes,

an assigning instruction block for assigning the one Responding CCA-capable node to

become the new gateway CCA, otherwise
the transmitting instruction block transmits a second vote.

97. (Original) The network of Claim 96 further comprising a determination instruction block for determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before the transmitting instruction block transmits a vote.

98. (Currently Amended) A computer-readable medium for enabling a cross layer communication capable node, herein referred to as CCA-capable node, the computer readable medium having computer-executable instructions for causing a computer in the CCA-capable node to perform operations of:

associating a CCA-capable node with a sub-network, the CCA-capable node capable of sending and receiving data to and from nodes within the sub-network; and

determining the CCA-capable node to assign as a gateway CCA, whereby said gateway CCA is used by the nodes within the sub-network to communicate with the rest of the network;

wherein the act of determining further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes; and

selecting a gateway CCA based upon the message from each CCA-capable node;

wherein the act of selecting further comprises acts of:

determining a current time at which the message was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received; and

selecting and assigning a new gateway CCA ~~based upon a result of a formula for comparing the current time and the gateway time~~ from the responding CCA-capable nodes such that $T_{LAST} < (\text{current time} - 2(T_1))$ is true, herein referred to as Responding CCA-capable nodes.

99. (Currently Amended) The computer-readable medium of Claim 98, wherein said act of determining further comprises acts of:

compiling a list of Responding CCA-capable nodes on at least one CCA-capable node of the plurality of CCA-capable nodes;

querying each CCA-capable node, from the at least one CCA-capable node, in the list to determine ~~[[its]]~~ the state of each CCA-capable node;

updating the list of Responding CCA-capable nodes based on a response from each of the CCA-capable nodes; and

checking for a response from the gateway CCA, and when:

the gateway CCA responds, repeating the querying act; otherwise, transmitting the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and

selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

100. (Cancelled)

101. (Currently Amended) The computer-readable medium of claim 98, wherein the act of determining further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node in the plurality of CCA-capable nodes, in the plurality of CCA-capable nodes to determine [[its]] the state of each CCA-capable node;

updating a list of Responding CCA-capable nodes, stored on the at least one CCA capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and

checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and when:

the gateway CCA is in the list of Responding CCA-capable nodes, said at least one node waiting for the next list of Responding CCA-capable nodes; otherwise,

selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

102. (Cancelled)

103. (Cancelled)

104. (Cancelled)

105. (Cancelled)

106. (Currently Amended) The computer-readable medium of Claim 98, wherein said act of determining further comprises acts of:
transmitting a vote from each Responding CCA-capable node to all other CCA-capable nodes identifying which CCA-capable node has been designated a subsequent gateway CCA; and
tallying said votes for each CCA-capable node, and when:
one CCA-capable node receives more votes than any of the other CCA capable nodes,
assigning the one CCA-capable node to become the new gateway CCA, otherwise
repeating the transmitting act.

107. (Original) The computer-readable medium of claim 106 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before performing the act of transmitting the vote.